
Remote IPE maintenance

This section describes Meridian 1 maintenance tools and procedures for identifying Fiber Remote Multi-IPE Interface, superloop, fiber-optic link, and Remote IPE faults, locating defective equipment, correcting problems by fixing or replacing defective equipment, and verifying the operation of the Remote IPE after corrections or replacements have been made.

Maintenance overview

Remote IPE maintenance deals with two types of problems:

- Installation
- Operation

Installation problems are created during the installation of an entire Meridian 1 with Remote IPE or during the addition of the Remote IPE to an existing system.

Operation problems occur when components fail or equipment is accidentally disconnected during normal system operation.

In either case, identifying the problem should be approached systematically. A problem may have more than one cause. To isolate the cause, a knowledge of Meridian 1 Remote IPE operation is required. This information can be found in “Product description” on page 3 in this manual. Once the cause is identified, the problem can be corrected by replacing the defective card or Fiber Remote Multi-IPE Interface unit, connecting accidentally disconnected cables, or correcting the system software problem.

Meridian 1 provides built-in self-diagnostic indicators and software and hardware tools. These diagnostic facilities simplify system troubleshooting and reduce mean-time-to-repair (MTTR).

This document focuses on the maintenance of Fiber Remote Multi-IPE Interface units at both sides of the fiber-optic link. System installation and maintenance guide sections of *Meridian 1 general maintenance information* (553-3001-500), *Meridian 1 fault clearing* (553-3001-510), and *Meridian 1 hardware replacement* (553-3001-520) describe how to maintain the entire Meridian 1 system. This chapter describes how to maintain the Fiber Remote Multi-IPE Interface unit as an integral part of Meridian 1.

It also describes how to maintain and troubleshoot the Superloop Network and the Peripheral Controller cards dedicated to the Remote IPE operation.

Diagnostic tools

Diagnostic tools are used to troubleshoot problems in Meridian 1 including problems with the Fiber Remote Multi-IPE Interface unit. When diagnosing Fiber Remote Multi-IPE Interface unit and Remote IPE problems, you may have to use more than one of these tools.

Hardware diagnostic tools

Recommended test equipment:

- Optical power meter (Fotec Model M712A or equivalent)
- Fiber-optic tracer (low power visible light source)
- Adjustable optical attenuator
- Fiber-optic patchcords and adapters (matching type of fiber and connectors for the single-mode and multi-mode fibers)
- Inspection microscope
- Pure isopropyl alcohol lint-free wipes
- Aerosol duster

Optional equipment:

- 1300 nm light source (LED or laser)
- Visual fault locator (high power visible light source)

- OTDR (Optical Time Domain Reflectometer), rent for occasional use
- Fiber identifier receiver

Meridian 1 hardware diagnostic tools consist of:

- card self-tests
- LED indicators
- display codes
- enable/disable switches

Test equipment

To facilitate the troubleshooting of the Fiber Remote Multi-IPE Interface and the fiber-optic link, it is recommended to have on hand an optical power meter (Fotec Model M712A or equivalent) to test the signal level of the optical transmitter and the signal level received over the fiber-optic link. Receiver sensitivity limit of -30 dBm can be measured. An adjustable fiber-optic attenuator can be used to test the sensitivity of the optical receiver. The patchcords are used to connect the meter, the light source, and to loopback the link or the Fiber Remote Multi-IPE Interface while performing the tests. The loopback patchcords (provided with equipment) should be attenuated by 15 dB for the single-mode and 10 dB for the multi-mode fibers.

Troubleshooting the fiber-optic link

To identify the problem with the fiber-optic link, you must check the attenuation across the entire link, the signal level at the receiver and the signal level at the transmitter, as follows:

- Unplug the connector at the receiver and using the power meter measure the received power on the link and compare it with the receiver signal level specification. If the received power is low, test the optical patch panel jumper. If the received power level is still too low, measure the transmitter. Refer to Table 4 “Fiber-optic transmit and receive signal levels” on page 27.
- Measure the transmitter power level using a good patch cable and the power meter. If the power is low, the problem is in the transmitter. If the transmitter output power level is within specifications, the fiber-optic link has too much signal attenuation.

- Check the optical patch panel. If attenuation in the patch panel is high, check the connections or splices in the patch panel.
- To check the fiber-optic link, you can start visual continuity check of the cable using a visual fault locator. This is usually the task of the fiber-optic link provider. Problems with the fiber-optic link may be caused by:
 - cable cut or cable stress
 - broken or damaged connectors
 - bad splices
- If the cable is more than 500 meters long, you can use the OTDR to locate the fault in the fiber-optic link.
- If an optical connector is suspected, use a microscope to inspect the fibers and the ferrules in the connector.

Self-test

A self-test is automatically performed by each Superloop Network card and Peripheral Controller card connected to the Fiber Remote Multi-IPE Interface unit when you insert it into an operating system module, when you enable the card, or when you power up or reset the system. You can also perform a self-test on these cards using software commands.

The Fiber Remote Multi-IPE Interface unit also performs self-test upon power up.

This self-test checks general card functions and determines if they are operating correctly. Upon insertion, the card automatically starts self-test and it gives you an immediate indication of its operating status.

LED indicators

Meridian 1 cards are equipped with red LED indicators, and module power supplies are equipped with green LED indicators. These indicators show the status of each card and power supply.

The Fiber Remote Multi-IPE Interface unit provides LED indicators to show the power status and the alarm status of the Fiber Remote Multi-IPE Interface unit and the fiber-optic link.

The Fiber Remote Multi-IPE Interface unit activates a red alarm LED when a fault occurs at the near-end and at the same time it activates the yellow alarm LED on the corresponding Fiber Remote Multi-IPE Interface unit at the far-end. It also provides an amber LED to indicate the test and maintenance activity on the fiber-optic link. This amber LED will also light if the system alarms are disabled.

Display codes

The Peripheral Controller card in the Remote IPE is equipped with an alphanumeric display on the faceplate. The display is used to automatically display the card status and identify possible faults with the card by displaying specific codes that correspond to the card status. These codes are displayed in hexadecimal notation and are listed and interpreted in Appendix A of this manual and in section (HEX) in *X11 input/output guide* (553-3001-400).

The display also indicates:

- It identifies the IPE controller, if the PSDL is successful
- Indicates current clock source or clock failure on superloops (on the controller card display)

These codes are also logged into a history file and can be printed and reviewed to analyze the sequence of events leading to the presently displayed status. The last 16 codes displayed by the Peripheral Controller card are stored in memory and can be reviewed and then cleared by using Network and Signaling Diagnostic Program LD 30.

Enable/disable switch

The Superloop Network card is equipped with an ENL/DIS switch. This ENL/DIS switch is located on the card's faceplate. It is used to disable the card before you remove it from an operating Meridian 1 system without disrupting other system functions. After you repair or replace the card, you can place it back in service by setting the switch to the ENL position.

System monitors and alarms

Meridian 1 system monitoring units continuously monitor the environmental and power status of the system and the individual system modules including the Remote IPE equipment.

The system monitor issues alarms when:

- CPU fails or system reloads
- main power source is lost
- power supply in the modules fails
- system temperature exceeds limits because of blower or fan failure

Meridian 1 alarms are based on the type and severity of faults reported by the system monitors and indicators. These alarms are divided into:

- major alarms, which indicate serious problems that require your immediate attention
- minor alarms, which indicate isolated faults relative to a limited number of call connection problems that do not require your immediate attention

The Fiber Remote Multi-IPE Interface unit issues a red alarm when a fault occurs at the near-end and at the same time it activates a yellow alarm on the corresponding Fiber Remote Multi-IPE Interface unit at the far-end.

Software diagnostic tools

Meridian 1 software diagnostic tools are used to monitor the system status, provide the ability to test various system functions and equipment suspected of being faulty, and log and display system fault history. These are:

- resident diagnostic programs
- interactive nonresident diagnostic programs

Resident programs

Meridian 1 resident programs are diagnostic and administration programs that continuously monitor system operation and report faults and generate system messages, which are displayed on the system terminal or printed on a system printer. These system messages are listed in *X11 input/output guide* (553-3001-400).

These messages are:

- maintenance display codes listed under HEX that indicate status and error conditions in the system

- maintenance messages listed under XMI are reported to the TTY that indicate status and faults with the Remote IPE equipment
- error messages listed under ERR that indicate hardware faults and under BUG that indicate software faults
- overload messages that indicate faulty peripheral cards listed under OVD
- error messages listed under PWR that indicate power faults
- fault history file that can be printed and reviewed to identify fault events leading to the present status

Resident administration programs provide automatic system administration routines that facilitate system initialization and fault recovery.

These are:

- overlay loader program that finds, loads, and executes all nonresident programs selected to run as midnight and background routines
- system loader program that downloads the call processing programs and starts checking main memory when executing sysload
- system initialization program that automatically starts after the system loader program completes the downloading process and outputs the initialization messages listed under INI in *X11 input/output guide* (553-3001-400)

Nonresident programs

Nonresident programs can be interactive or automatically executed programs. These programs are stored on the system hard disk or floppy disks and are loaded by the overlay loader program into system memory on demand or at a predetermined time of day such as for midnight and background routines testing.

You can access interactive programs through a maintenance terminal. These programs are used to:

- test the equipment and place lines and trunks out of service when testing or faulty and back into service when testing is completed or the line or trunk has been repaired or replaced

- verify the status of a fault
- verify that a fault has been corrected and the equipment is operating correctly

You can select a number of nonresident diagnostic programs by using Configuration Record Program LD 17. This is a program that selects other diagnostic programs and executes them automatically as midnight and background routines. These programs test the entire system and print a report that lists the test results.

You can also manually select continuity tests that check continuity between the Superloop Network card in Meridian 1 and the Peripheral Controller card in the Remote IPE module, as well as other network and peripheral cards. You can specify these tests in Background Signaling and Switching program LD 45. BSD messages indicate the status of the network continuity tests and other network problems.

Superloop and Controller cards maintenance commands

The maintenance commands for the Superloop Network card and Peripheral Controller cards are used to manipulate the operational status and perform diagnostic tests on these cards. These commands are located in Network and PE Diagnostic LD 32, which can be accessed using the administration terminal or the MMI terminal used in the Host SDI mode.

Table 18 lists superloop maintenance commands provided by Network and PE Replacement Diagnostic LD 32. NPR000 are diagnostic messages displayed to indicate the status of the equipment.

Table 18
Meridian 1 network superloop maintenance commands

Maintenance command	Maintenance command description
DISL loop	Disables network loop
ENLL loop	Enables network loop
DISS I s	Disables a shelf or module
ENLS I s	Enables a shelf or module
DSXP x	Disables Peripheral Controller and all IPE cards
ENXP x	Enables Peripheral Controller and all IPE cards
ENXP XPEC x	Enables Peripheral Controller but not IPE cards
STAT loop	Displays status for one or all network loops
SUPL loop	Prints data for one or all superloops. Maps from superloop number to IPE controller number.
XNTT loop	Self-test on a Network card for a specific loop
XPCT x	Self-test on Peripheral Controller x
XPEC x	Prints data for Peripheral Controller x. Maps from IPE controller number to superloop number.
IDC	Test Card-LAN operation and queries superloop, peripheral controller, and IPE cards. Returns part numbers and serial numbers of cards.

Remote IPE MMI maintenance commands

The Fiber Remote Multi-IPE Interface unit provide a man-machine interface (MMI) port to connect a configuration and maintenance terminal. Through this terminal, you can directly issue commands to the Fiber Remote Multi-IPE Interface to test the Fiber Remote Multi-IPE Interface unit, the superloops connected to the unit, and the fiber-optic link.

The MMI terminal can also be used to configure, maintain, and test the Meridian 1 system when placed in the Host SDI mode.

Table 19 lists all MMI commands that are used to configure, maintain, and test the Fiber Remote Multi-IPE Interface associated superloops and the fiber-optic link.

Table 19
MMI commands (Part 1 of 3)

Command	Description
A D	Alarm disable. Disables all alarms.
A E	Alarm enable. Enables all alarms.
C A	Clear alarm. Clears all alarms and resets the fiber-optic link bit error rate counters.
C A L	Clear alarm log. Clears near-end fiber link alarm log.
C A L D	Clear alarm log. Clears far-end fiber link alarm log.
C E	Clear error log. Clears near-end fiber link error log.
C E D	Clear error log. Clears far-end fiber link error log.
D A [P]	Display alarms [Pause]. Displays the alarm log for the near-end. It contains the previous minute and the most recent 100 alarms logged with time and date stamp.
D A D	Display alarms. Displays the alarm log for the far-end. It contains the previous minute and the most recent 100 alarms logged with time and date stamp.

Table 19
MMI commands (Part 2 of 3)

Command	Description
D C [P]	Display configuration [Pause]. Displays current near-end configuration such as time, date, name, and link bit error threshold.
D C D	Display configuration. Displays current far-end configuration such as time, date, name, and link bit error threshold.
D E [P]	Display error [Pause]. Displays near-end error log, which contains the previous minute and the last 30 days of the fiber-optic link error statistics.
D E D	Display error. Displays far-end error log, which contains the previous minute and the last 30 days of the fiber-optic link error statistics.
D S [P]	Display status [Pause]. Displays near-end superloop and fiber-optic link status.
D S D	Display status distant. Displays far-end superloop and fiber-optic link status.
H or ?	Help. Displays the help screen.
HOST or HO	Connects the MMI terminal to the SDI port. The password is HOST .
L	Logs into the MMI terminal for one Fiber Remote Multi-IPE Interface. The password is FIBER .
L xx	Logs into a specific superloop when the system has more than one Fiber Remote Multi-IPE Interface connected in a daisy-chain, where xx is the Fiber Remote Multi-IPE Interface address in the chain. The password is also FIBER .
Q	Logs the terminal user out.
S A	Sets the fiber-optic link bit errors per minute alarm threshold in the range from 10^{-10} to 10^{-6} .

Table 19
MMI commands (Part 3 of 3)

Command	Description
S C	Sets alarm self-clearing function to either “enable” or “disable”.
S D	Sets date or verify current date.
S L	Set link. Configures which fiber-optic link (A or B) is selected to transmit data, for a redundant link.
S N	Set name. Sets the name for the site and superloops. The site name can be 9 characters long and the superloop name can be 5 characters long. These names are shown in the Display Status screen.
S T	Sets time or verifies current time.
T A	Test all. Initiates a series of pre-programmed tests on the near and far-end superloops and fiber-optic links. Test duration can be set from 1 to 98 minutes. By entering 0, the tests run one time. To stop testing enter STOP .
T FI	Test fiber. Initiates a series of pre-programmed tests on the fiber-optic links. Test duration can be set from 1 to 98 minutes. By entering 0, the tests run one time. To stop testing enter STOP .
T SL	Test near-end superloop. Initiates a series of pre-programmed tests on the near-end superloops. Test duration can be set from 1 to 98 minutes. By entering 0, the tests run one time. To stop testing enter STOP .
T SL D	Test far-end superloop. Initiates a series of pre-programmed tests on the far-end superloops. Test duration can be set from 1 to 98 minutes. By entering 0, the tests run one time. To stop testing enter STOP .
@@@	Terminates the Host SDI mode and returns the terminal to the MMI mode.

Background diagnostics

The Fiber Remote Multi-IPE Interface MPU continuously monitors the Fiber Remote Multi-IPE Interface functions, the fiber-optic link performance, and the superloop status.

If the Fiber Remote Multi-IPE Interface MPU detects loss of clock, loss of frame, loss of signal, or excessive bit error rate, the following alarm conditions are exhibited:

- The normally open alarm contacts are closed at both ends of the link.
- The red alarm LED is lit at the near-end of the fault and a yellow alarm LED is simultaneously lit at the far-end of the fiber-optic link.
- The MMI maintenance terminal displays the error report and the printer, if equipped, prints the error report.
- The alarm log file is updated with the latest error condition.
- The system monitor reporting is interrupted for one second.

Off-line and on-line diagnostics

Off-line diagnostic tests are potentially traffic affecting if they are performed on an active superloop that has to be disabled or an active superloop is tested by mistake. Normally the tests are performed on disabled superloops. Therefore, before you can test a superloop, you must disable that superloop using overlay programs LD 32. These tests are more extensive than background tests, even though they also test for loss of clock, loss of frame, loss of signal, and excessive bit error rate on the fiber-optic link.

On-line diagnostic test are performed with the Microlink up and are not traffic affecting. If the Microlink is down, the system assumes that there is a loopback condition.

The off-line commands are:

- TEST SUPERLOOP (T SL). Tests a specified near-end superloop.
- TEST SUPERLOOP DISTANT (T SL D). Tests a specified far-end superloop.

- TEST FIBER (T FI). Tests near-end Fiber Remote Multi-IPE Interface, the fiber-optic link, and the far-end Fiber Remote Multi-IPE Interface.
- TEST ALL (T A). Tests all the functions tested by the above two test commands.

On-line diagnostic tests:

The on-line diagnostic test are conducted with the Microlink up and are not traffic affecting. Such a test is TEST FIBER (T FI). It tests near-end Fiber Remote Multi-IPE Interface, the fiber-optic link, and the far-end Fiber Remote Multi-IPE Interface. This test may become traffic affecting if during the test the redundant fiber-optic link fails.

Isolating and correcting faults

Now that you are familiar with the troubleshooting tools, you can begin troubleshooting the Fiber Remote Multi-IPE Interface units and Remote IPE equipment. Based on whether Remote IPE equipment has just been installed and is not yet operational or it had been operating correctly and is now faulty, you can determine what may be the most probable cause of failure.

Types of faults

Problems can occur in the following areas:

- Hardware
- Configuration
- Software

The types of faults you must isolate and correct depend on when the faults occur during installation or in a previously operating system. For example, in a newly installed system, the fault may be in any or all of the three areas; however, in a previously operating system, the fault will probably be in the hardware.

Fault isolation steps

The following steps show you how to isolate Remote IPE faults using the diagnostic tools described in this chapter:

- 1** Observe and list the problem symptoms the system is exhibiting. Typical symptoms can include the: Superloop Network card or Peripheral Controller cards LEDs are ON, the Peripheral Controller card faceplate display showing a fault code, or the Fiber Remote Multi-IPE Interface LEDs indicating no transmission on the fiber-optic link.
- 2** Note whether Remote IPE was just installed and has not been operating, or if it has been operating correctly and is now faulty. Based on this, refer to “Newly installed Remote IPE” on page 131 or “Previously operating Remote IPE” on page 132 for lists of the most common problems.
- 3** Take the action recommended by the fault isolation and correction tables, which will guide you through fault isolation steps and recommend what test procedures to use.
- 4** If after following the diagnostic procedures the Remote IPE still does not operate correctly, contact your field service representative.

Newly installed Remote IPE

Problems that occur during the installation of an entire system, including the Remote IPE, are usually caused by:

- improperly installed cards
- loose or improperly connected external communication cables, or fiber-optic link cables
- incorrect Remote IPE configuration (local versus remote)

These types of problems may also occur when:

- installing additional Remote IPE equipment into an already operating system
- installing a new software version or changing Remote IPE configuration

Check the symptoms listed in Table 20 that are related to problems with a newly installed Remote IPE.

Previously operating Remote IPE

Problems that occur during the normal operation of Remote IPE are usually caused by:

- faulty equipment
- accidental disconnection of cables
- improper environmental conditions

Check the symptoms also listed in Table 20 that are related to problems with a previously operating Remote IPE.

Remote IPE fault isolation and correction

Fault isolation and correction of Remote IPE equipment encompasses the Superloop Network cards and Peripheral Controller cards that support the fiber-optic link, and the Fiber Remote Multi-IPE Interface units at each end of the link.

Table 20 refers you to the test procedures in this manual that will most likely be able to resolve the problem based on the symptoms you observe.

Table 20
Meridian 1 Remote IPE equipment problems (Part 1 of 2)

Symptoms	Diagnosis	Solution
Red LED on the Superloop Network card or Peripheral Controller card permanently on.	Card is disabled or faulty.	Go to <i>Procedures 1, 2, or 3</i> and <i>4</i> in this chapter to check the card status and perform self-test.
Power LED on the Fiber Remote Multi-IPE Interface unit is off.	Power is not supplied to the Fiber Remote Multi-IPE Interface unit or the unit failed self-test upon power up.	Check the AC/DC converter and the connections to the Fiber Remote Multi-IPE Interface unit and the AC outlet on the wall. If powered directly from a DC source, check the source and the connection to the unit. If the power is present, the Fiber Remote Multi-IPE Interface unit is faulty. Replace it.

Table 20
Meridian 1 Remote IPE equipment problems (Part 2 of 2)

Symptoms	Diagnosis	Solution
Yellow Alarm LED on the Fiber Remote Multi-IPE Interface on.	Far-end is in red alarm state and there is no communication over the link.	Check fiber-optic link connections and go to <i>Procedure 6</i> to display the status. Then go to <i>Procedure 7</i> to test the superloop and the fiber-optic link.
Red Alarm LEDs on the Fiber Remote Multi-IPE Interface on.	Near-end Fiber Remote Multi-IPE Interface unit or fiber-optic link faulty.	Check fiber-optic link connections and go to <i>Procedure 6</i> to display the status. Then go to <i>Procedure 7</i> and <i>Procedure 8</i> to test the equipment.
Both red and yellow Alarm LEDs are on the Fiber Remote Multi-IPE Interface.	Fiber-optic link is faulty.	Check the link cable connections to the Fiber Remote Multi-IPE Interface unit. Go to <i>Procedure 7</i> and <i>Procedure 9</i> to test the fiber-optic link.
Amber Maintenance LED is on.	Alarms are disabled or off-line diagnostic test is in progress.	Enable the alarms, if disabled. Wait for the test to complete and analyze the results of the test. Otherwise terminate the off-line test by entering S (stop) command at the MMI terminal.
Link is OK but no communication with the system monitor.	System monitor address incorrect.	Define a unique address correctly. Observe the XMI messages on the MMI terminal and check the description of these messages listed in Also refer to <i>X11 input/output guide</i> (553-3001-400) Use this information to locate and correct the fault.
Display on the Peripheral Controller card shows fault codes.	Card faulty. Failed self-test or problem communicating with peripheral equipment.	Go to <i>Procedures 3, 4 and 8</i> to check tracking and loopback. Also refer to <i>Appendix A</i> . for a list of codes. Based on the test results and maintenance display codes description, take the appropriate action and resolve the problem.
Error messages displayed on the MMI terminal or printed on the Meridian 1 TTY.	Hardware or software problems with the Remote IPE.	Note various error messages. Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of these messages and their description. Based on the code's description, take the appropriate action to resolve the problem.

If you cannot resolve the problem after exhausting all available diagnostic tools and test procedures, make a list of the symptoms and contact your field service representative.

Superloop Network card fault isolation and correction

The Superloop Network card provides a communication interface between the CPU in Meridian 1 and the Peripheral Controller card in the Remote IPE.

The Superloop Network card processes signaling information and data received from the Peripheral Controller card over the fiber-optic link.

Problems with the Superloop Network card may be caused by hardware faults, incorrect configuration, a disabled Superloop Network card, or continuity problems between the card and other network cards connected to the network bus. To isolate and correct problems with the Superloop Network card, follow the procedures below.

Procedure 1

Checking the status of the Superloop Network card

The diagnosis in Table 20 indicates that the Superloop Network card may be faulty or disabled. The first step in identifying the problem is to verify the status of the Superloop Network card. The status of a Superloop Network card is obtained by executing the **STAT sl** command in Network and Signaling Diagnostic Program LD 30.

To obtain the Superloop Network card status:

- 1 Log in on the MMI maintenance terminal, first as **FIBER** to get into the MMI mode, and then login as **HOST** to get into the Host SDI mode.

Note: If you entered the **HO** command while someone else is active in the Host SDI mode, the system will not allow you to log in and it will display on your terminal "CONN DENIED".
- 2 At the **>** prompt, type **LD 30** and press the Enter key to access the Network and Signaling Diagnostic Program LD 30.
- 3 Type **STAT sl** and press the Enter key, where **sl** is the superloop number of the Superloop Network card you are testing.
- 4 If the response is **UNEQ** = then the superloop is not equipped (the Superloop Network card is not installed).

- 5** If the Superloop Network card is manually disabled using LD 30, the response can be:
- DSBL: NOT RESPONDING = the loop is disabled and the card is not responding (the card is missing, disabled by the EBL/DIS switch, or faulty).
- DSBL: RESPONDING = the loop is disabled and the card is responding (the card is disabled with DISL command, the Peripheral Signaling card is disabled, or an overload condition exists).
- Note:** Overload conditions are indicated by OVDxxx messages. Refer to *X11 input/output guide* (553-3001-400) for the message description and indication of the problem.
- x BUSY, y DSBL = the loop is enabled with x channels busy and y channels disabled.
- CTYF L1 L2... = loop specified in STAT command cannot receive speech from one or more loops or there is a possible continuity test failure due to a faulty network card such as the Superloop Network card.
- Type **ENLL sl** and press the Enter key to enable the superloop, where **sl** is the Superloop Network card superloop number. A message indicating that the Superloop Network card is enabled and working is displayed on the console. Also observe the red LED on the Superloop Network card. If it turns off, the Superloop Network card is functioning correctly. If the LED continues to stay on, the Superloop Network card probably failed self-test and a message should be displayed on the maintenance terminal to that effect.
- If the message indicates that the Superloop Network card is faulty, replace the card.

Procedure 2

Performing the Superloop Network card self-test

If the Superloop Network card appears faulty, you should conduct the self-test to verify that it is actually faulty before you replace it. This test verifies the basic Superloop Network card functions and outputs a fail or pass message after the test is completed.

To perform the self-test, follow the steps below:

- 1 Log in on the maintenance terminal as Host SDI.
- 2 At the **>** prompt, type **LD 32** and press the Enter key to access the Network and PE Diagnostic Program LD 32.
- 3 Type **DISL sl** and press the Enter key to disable the Superloop Network card, where **sl** is the Superloop Network card loop number you are disabling.
- 4 Type **XNTT sl** and press the Enter key to start the self-test, where **sl** is the Superloop Network superloop number specified for self-test.

If the response is:

TEST PASSED

The Superloop Network card passed the self-test and is functional; it must be enabled to turn off the red LED and to start processing calls.

If the Superloop Network card passed the self-test, but the problem persists, the loop or other cards that interface with the Superloop Network card may be faulty. To verify the integrity of the network bus and connections between the Superloop Network card and other network and peripheral equipment cards interfacing with the Superloop Network card, go to Procedure 3.

If the response is

TEST FAILED REASON: xxxx

XPEC NOT CONNECTED

The Superloop Network card failed the self-test and is faulty, where **xxxx** can be one of the following values:

0—ROM checksum failed
1—FLASH checksum failed
2—A21 #1 faulty
3—A21 #2 faulty
4—R71 faulty

Replace the Superloop Network card as described in Replacement procedures. NPRxxx message may be displayed as a result of a command activated self-test if the Superloop Network card is missing, not configured, and so on.

- 5** Exit LD 32 by typing **** at the prompt.

Peripheral Controller card fault isolation and correction

The Peripheral Controller card provides a communication interface between the Superloop Network card and the IPE cards housed in the Remote IPE module.

Problems with the Peripheral Controller card may be caused by hardware faults, incorrect configuration, a disabled Peripheral Controller card, or continuity problems between the card and IPE cards connected to the peripheral bus. To isolate and correct problems related to the Peripheral Controller card, follow the procedures below.

Procedure 3:

Checking the Peripheral Controller card tracking status

The Peripheral Controller card can display tracking information, which shows the status of the Peripheral Controller card phase-lock loop and to what clock source it is locked. To obtain this information, execute the **RPED I s** command in Network and Signaling Diagnostic Program LD 30.

To obtain the Peripheral Controller card tracking status:

- 1 Log in on the maintenance terminal as Host SDI.
- 2 At the **>** prompt, type **LD 30** and press the Enter key to access the Network and Signaling Diagnostic Program LD 30.
- 3 Type **RPED I s** and press the Enter key, where **I** is the loop number of the Superloop Network card and **s** is the shelf or module you are testing.

The Peripheral Controller card may return one of the following codes:

C0—Controller is locked on the network superloop connected to SL0

C1—Controller is locked on the network superloop connected to SL1

C2—Controller is locked on the network superloop connected to SL2

C3—Controller is locked on the network superloop connected to SL3

CF—Controller is not locked on any network superloop

- 4 Exit LD 30 by typing ******** at the prompt.
- 5 Check the incoming signal. If present, replace the Controller; otherwise, find the problem on the link or the Fiber Remote Multi-IPE Interface unit.

Procedure 4**Performing the Peripheral Controller card self-test**

If the Peripheral Controller card appears faulty, you should conduct the self-test to verify that it is actually faulty before you replace it. This test verifies the basic Peripheral Controller card functions and outputs a fail or pass message after the test is completed. During self-test the Peripheral Controller card displays HEX messages indicating the test performed. To identify the codes displayed, refer to Table 0-1.

To perform the self-test, follow the steps below:

- 1** Log in on the maintenance terminal as Host SDI by entering the password **HOST** from the MMI mode.

Note: If you entered the **HO** command while someone else is active in the Host SDI mode, the system will not allow you to log in and it will display on your terminal "CONN DENIED".
- 2** At the **>** prompt, type **LD 32** and press the Enter key to access the Network and PE Diagnostic Program LD 32.
- 3** Type **DSXP x** and press the Enter key to disable the Peripheral Controller card, where **x** is the Peripheral Controller card you are disabling.

- 4 Type **XPCT x** and press the Enter key to start the self-test, where **x** is the Peripheral Controller card specified for self-test.

If the response is:

TEST PASSED

The Peripheral Controller card passed the self-test and is functional. It must be enabled to turn off the red LED and start processing calls.

Type **ENXP x** and press the Enter key to enable the card.

If the Peripheral Controller card passed the self-test, but the problem persists, the Fiber Remote Multi-IPE Interface, the fiber-optic link, or other cards that interface with the Peripheral Controller card may be faulty.

If the response is:

TEST FAILED REASON: xxxx

The Peripheral Controller card failed the self-test and is faulty, where **xxxx** specifies the cause of the fault. An **NPRxxx** message may be displayed as a result of a command activated self-test if the Peripheral Controller card is missing, not configured, and so on.

- 5 Exit LD 32 by typing ******** at the prompt.

Fault isolation and correction using MMI maintenance commands

You can perform testing and troubleshooting of the Fiber Remote Multi-IPE Interface units and Remote IPEs from a local or a remote MMI terminal by typing MMI commands on the terminal without loading system diagnostic programs (overlays).

These commands provide current equipment status, perform superloop and link testing, check equipment performance, print messages from log files, and clear alarm and error logs.

Procedure 5**Display alarm and error logs to check the performance history**

Display Alarm:

This procedure uses MMI commands to display the superloop and the fiber-optic link performance history.

- 1 Log in on the MMI maintenance terminal.:

FI::>L Login command
Enter Password > **FIBER** Type in the password.

- 2 Type **D A [P]** (DISPLAY ALARM) to display near-end superloop and fiber-optic link alarm history. Type **D A D** (DISPLAY ALARM DISTANT) to display far-end superloop and link alarm history. The **[P]** or pause, allows you to display a full screen of events at the time.

The response is displayed on the screen and shows the time and date, of each alarm or error event.

Example:

FI::>D A
Fiber Remote IPE S/N 2502-R3 Software Version 3.11 5/15/96
10:45
Local Site
In Alarm State: NO (superloops are not in the alarm state)

01/22/96 09:26 No Activity Superloop 1
01/22/96 09:26 Activity On Superloop 1
01/22/96 09:25 No Activity Superloop 1
01/22/96 09:25 Activity On Superloop 1
01/22/96 09:24 No Activity Superloop 4
01/22/96 09:20 No Activity Superloop 3
01/22/96 09:17 Activity On Superloop 4
01/22/96 09:17 Activity On Superloop 3
01/22/96 09:17 Activity On Superloop 2
01/22/96 09:17 Fiber Link Up
01/22/96 09:16 Fiber A Threshold Exceeded
01/22/96 09:16 Fiber Link Down
01/22/96 09:15 Performed a Power Up Reset
01/22/96 09:15 Initialized Memory
01/22/96 09:10 Log Cleared

You can clear the near-end (local) alarm log by executing the **C AL** (CLEAR ALARM) and the far-end (remote) by executing the **C AL D**

(CLEAR ALARM DISTANT) command.

- 3 Type **D E [P]** (DISPLAY ERROR) to display near-end superloop and fiber-optic link error history. Type **D E D** (DISPLAY ERROR DISTANT) to display far-end superloop and fiber-optic link error history. The **[P]** or pause, allows you to display a full screen of events at the time.

The log file contains 30 days of error statistics. During each midnight routine, the file stores the highest error rate minute detected in the last 24 hours and time and date when it occurred. If the redundant link is present, the error statistics of both links will be displayed. The response is displayed on the screen as follows:

Example:

```
Fil::>D E  
Fiber Remote IPE S/N 2502 Software Version 3.11 5/15/96 10:45  
Local Site  
In Alarm State: NO (superloops are not in the alarm state)
```

You can clear the near-end (local) error log by executing the **C E** (CLEAR ERROR) and the far-end (remote) by executing the **C E D** (CLEAR ERROR DISTANT) command.

Procedure 6**Checking the superloop and the fiber-optic link status**

This procedure uses MMI commands to display the superloop and the fiber-optic link status.

To obtain the superloop and link status:

- 1** Log in on the MMI maintenance terminal:

FII::>L	Login command
Enter Password > FIBER	Type in the password.

- 2** Type **D S** (DISPLAY STAUTS) to display near-end superloop and fiber-optic link status. Type **D S D** (DISPLAY STATUS DISTANT) to display far-end status.

The response is displayed on the screen and shows the software version, present time and date, alarm status, error rate, and the superloop link status.

Example:

```

FII::>D S
Fiber Remote IPE S/N 25002-R3 Software Version 2.05 04/15/96
9:25
Local Site
In Alarm State: NO (superloops are not in the alarm state)

Fiber A Threshold Alarm Active: NO
Error Rate: E-99 Todays Max: 04/15/96 9:25 Error Rate: E-6

Superloop Link 1 ALARM MODE Superloop Link 2 NORMAL
Superloop Link 3 INACTIVE Superloop Link 4 NORMAL

```

The Error Rate: E-99 indicates no error have been detected
 The Error Rate: E-0 indicates that no signal has been detected

The superloop can be in:

- Alarm mode when a fault is detected
- Inactive mode when the superloop cable is not installed
- Normal (active) mode when the superloop is operating correctly

- 3** Analyze the response and determine where the problem may be, if any. If the near-end superloop is faulty, the problem may be in the superloop cables, the Superloop Network card, or the Fiber Remote Multi-IPE Interface unit. Visually check each component and correct the problem. Otherwise go to Procedure 8 "Testing the superloop" on page 146.

- 4 If the D S D command shows problem with far-end communication, the problem may be in the fiber-optic link, link connectors, or the far-end Fiber Remote Multi-IPE Interface. Go to Procedure 7 "Testing the superloops and the fiber-optic link" below.

Procedure 7

Testing the superloops and the fiber-optic link

This procedure uses the MMI commands to test all superloops and fiber-optic links. To perform these tests, execute the (TEST ALL) **T A** command. This test will interfere with normal traffic, therefore all superloops should be disabled.

- 1 To disable all superloops, you wish to test, place the MMI terminal into the Host SDI mode:

FIH::>HO

Enter Password:> HOST (all caps)

- 2 At the prompt type **LD 32** and press the Enter key to access the overlay. Then execute the **DISL sl** command for each superloop, where **sl** is the superloop number.
- 3 Now you have to place the MMI terminal into the MMI mode by entering **@ @ @**.

- 4 To test the disabled superloop and the fiber-optic link, execute the **T A** command at the MMI terminal. You have the option of running the test once by typing **0** or you can run the test for a number of minutes from **1** to **98** by typing the number of minutes. By typing **99**, the test will run continuously until stopped. You can stop the test by typing **S**.

Example:

FI::>T A

Enter Duration of Test (1-98 Mins, 0= Once, 99= Forever)

Verify Super Loops are Disabled. Hit Q to quit or any Key to Cont

Link 1 PASSED

Link 2 PASSED

Link 3 PASSED

Link 4 PASSED

Link 5 PASSED

Link 6 PASSED

Link 7 PASSED

Link 8 PASSED

DS-30 Link Test Completed

DS-30A Frame 1 PASSED

DS-30A Frame 2 PASSED

DS-30A Frame Test Completed

DS-30A Clock 1 PASSED

DS-30A Clock 2 PASSED

DS-30A Clock Test Completed

Test Fiber A

Micro Link Up. Test Using Distant Loopback

Fiber Message Test Passed

Fiber Test Completed

All Tests Completed. All Tests Passed.

- 5 Analyze the response and determine where the problem may be, if any. If the superloop is faulty, the problem may be in the superloop cables, the Meridian 1 card (Superloop Network or Peripheral Controller card), or the Fiber Remote Multi-IPE Interface unit.
Go to Procedure 8 to troubleshoot the superloop problems.
Go to Procedure 9 to troubleshoot the fiber-optic link problems.
- 6 After the test has been completed, return the terminal in the Host SDI mode and enable each disabled superloop by executing the **ENLL si** command in LD 32.

Procedure 8

Testing the superloop

This procedure uses the MMI commands to test a superloop connected to the near-end or the far-end Fiber Remote Multi-IPE Interface units.

To test a near-end superloop, execute the (TEST SUPERLOOP) **T SL** command.

To test a far-end superloop, execute the (TEST SUPERLOOP DISTANT) **T SL D** command.

- 1 Before you can start the test, you must disable the superloop you wish to test by placing the MMI terminal into the Host SDI mode:

FI::>HO
Enter Password:> HOST)

- 2 At the prompt type LD 32 and press the Enter key to access the overlay. Then execute the **DISL sl** command to disable the superloop **sl**.
- 3 Now you have to place the MMI terminal into the MMI mode by entering **@@@**.
- 4 To test the disabled near-end superloop, execute the **T SL** command at the MMI terminal.

- 5 To test the disabled far-end superloop, execute the **T SL D** command at the MMI terminal. You have the option of running the test once by typing **0** or you can run the test for a number of minutes from **1** to **98** by typing a number that represents minutes. By typing **99**, the test will run continuously until stopped. You can stop the test by typing **S**.

Example:

```


FI::>T SL
Enter Super Loops to Test (1-4) 1
Enter Duration of Test (1-98 Mins, 0= Once, 99= Forever)
Verify Super Loops are Disabled. Hit Q to quit or any Key to Cont
Testing Super Loop 1
Link 1 PASSED
Link 2 PASSED
Link 3 PASSED
Link 4 PASSED
DS-30 Link Test Completed

DS-30A Frame 1 PASSED
DS-30A Frame Test Completed

DS-30A Clock 1 PASSED
DS-30A Clock Test Completed
Super Loop 1 PASSED
Test Summary
Super Loop 1 PASSED)

```

- 6 If the test shows problems with superloops, check the superloop cable connections, the Fiber Remote Multi-IPE Interface, and the Meridian 1 cards (Superloop Network and Peripheral Controller card). Check each component and replace the faulty one. Execute the **T SL** and **T SL D** commands until the status shows problem free operation.
- 7 After the test has been completed, return the terminal in the Host SDI mode and execute the **ENLL sl** command in LD 32.

Procedure 9

Testing the fiber-optic link

This procedure tests the Fiber Remote Multi-IPE Interface at both ends of the link and the fiber-optic link itself. If a redundant link is configured, this test will check both links.

This test will interfere with normal traffic, therefore all superloops should be disabled.

- 1 To disable all superloops, place the MMI terminal into the Host SDI mode:

```
FI::>HO  
Enter Password:> HOST)
```

- 2 At the prompt type **LD 32** and press the Enter key to access the overlay. Then execute the **DISL sl** command for each superloop, where **sl** is the superloop number you are disabling.
- 3 Now you have to place the MMI terminal into the MMI mode by entering **@@@**.
- 4 To test the fiber-optic link, execute the (TEST FIBER) **T FI** command at the MMI terminal. You have the option of running the test once by typing **0** or you can run the test for a number of minutes from **1** to **98** by typing the number of minutes. By typing **99**, the test will run continuously until stopped. You can stop the test by typing **S**.

Example:

```
FI::>T FI  
Enter Duration of Test (1-98 Mins, 0= Once, 99= Forever)  
Test May Interfere with XSM Traffic. Hit Q to quit or any Key to Cont  
Test Fiber A  
Micro Link Up. Test Using Distant Loopback  
Fiber Message Test Passed  
Fiber Test Completed
```

(after introducing a fault in the link)

```
Fiber A Threshold Exceeded  
Fiber Link Down  
Distant-Fiber A Threshold Exceeded  
Fiber Link Restored (after correcting the fault)  
Distant-No Activity Super Loop 1  
Distant-Activity On Super Loop 1
```

- 5 If the test results shows problem with communication across the fiber-optic link, the problem may be in the fiber-optic link, link connectors, or the far-end Fiber Remote Multi-IPE Interface.
- 6 Check the fiber-optic cables and optical connectors to verify that they are properly connected.
- 7 Execute **T FI** command again to check if the problem still exists.

- 8 If the problem persists, disconnect the fiber-optic link from the Fiber Remote Multi-IPE Interface optical connectors and install the appropriate attenuated fiber-optic patchcord into the RCV and XMIT optical connectors on the faceplate to create a loopback.
- 9 Execute **T FI** command again to check if the problem still exists. If the problem still exists, replace the Fiber Remote Multi-IPE Interface unit.
- 10 If the problem is not detected, the problem must be in the fiber-optic link.
- 11 Connect an optical power meter to the RCV connector on the link and measure the received signal power. If the power is between -30dBm and -8 dBm, the signal is being received from the far-end.
- 12 If no signal is detected, check the fiber-optic link and ST optical connectors. Check the splices and clean the connectors.

CAUTION

Keep the optical connectors absolutely clean. Use pure isopropyl lint-free wipes to clean the ferrule part of the optical connector and aerosol duster to blow out dust particles from the adapter part of the optical connector.

Make sure that the ferrules in the optical connectors are properly installed and aligned in their respective adapters. This is particularly critical for the single-mode fibers where tolerances are tighter.

- 13 To verify the integrity of the fiber-optic link, use a light source at one end of the link and the power meter at the other to measure the attenuation in the link and thus determine if each branch of the link is meeting the expected signal attenuation. If not, the link problem has to be corrected.
- 14 If the problem with the fiber-optic link has been corrected, reinstall the link connectors into the Fiber Remote Multi-IPE Interface ST faceplate connectors and execute the **T FI** command again.
- 15 If the problem still exists, repeat steps 8 and 9 at the far-end.
- 16 If the problem is finally corrected, execute the **T A** command as described in Procedure 7 to test the link and superloops again and verify that all the problems have been corrected.
- 17 After the test has been completed, return the terminal in the Host SDI mode and enable each disabled superloops by executing the **ENLL sl** command in LD 32.

Replacing Remote IPE equipment

If after completing troubleshooting you determine that one or more Remote IPE cards or the Fiber Remote Multi-IPE Interfaces are defective, you will have to remove them and replace them with spares. When you insert a spare Superloop Network card or Peripheral Controller card in the module, observe the card LED to determine if the card passed self-test. Package and ship the defective cards to an authorized repair center.

Unpacking replacement equipment

Unpack and visually inspect replacement equipment as follows:

- 1 Inspect the shipping container for damage. Notify your distributor if you find that the container is damaged.
- 2 Remove the unit carefully from the container. Do not puncture or tear the container—use a utility knife to open it. Save the container and the packing material for shipping the defective card.
- 3 Visually inspect the replacement equipment for obvious faults or damage. Report the damage to your sales representative.
- 4 Keep cards in their antistatic bags until you are ready to install them. Do not stack them on top of each other.
- 5 Install cards. When handling the cards, hold them by their nonconducting edges to prevent damage caused by static discharge.

Removing and replacing a card

A Remote IPE card can be removed from and inserted into a Meridian 1 module or the Remote IPE module without turning off the power to the module. This feature allows Meridian 1 to continue normal operation when you are replacing a Superloop Network card in Meridian 1 or a Peripheral Controller card in the Remote IPE module.

Removing and replacing a Superloop Network card

- 1 Disable the Superloop Network card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DIS sl**, where **sl** is the actual loop number of the Superloop Network card.
- 2 Set the ENL/DIS switch to DIS.
- 3 Disconnect the card faceplate cables.
- 4 Unlatch the card's locking devices by squeezing the tabs and pulling the upper locking device away from the card and pressing the lower locking device downward.
- 5 Pull the card out of the network module and place it into an antistatic bag away from the work area.
- 6 Set the replacement card ENL/DIS switch to DIS.
- 7 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 8 Pull the upper and lower locking device away from the faceplate and insert the card firmly into the backplane connector. Press the upper and lower locking devices firmly against the faceplate to latch the card inside the module.
- 9 Set the ENL/DIS switch on the Superloop Network card to ENL. The Superloop Network card automatically starts the self-test.
- 10 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test; go on to step 12. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Superloop Network card.
- 11 Connect the I/O panel cables to the J1 and J2 faceplate connectors of Superloop Network card.

- 12 Set the ENL/DIS switch to ENL. If the red LED on the Superloop Network card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated on the system terminal or TTY (or the MMI terminal connected to the Fiber Remote Multi-IPE Interface MAINT connector). If the LED stays on, go to “Isolating and correcting faults” on page 130 in this document.
- 13 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier’s repair depot.

Removing and replacing a Peripheral Controller card

- 1 Log in on the TTY or the MMI maintenance terminal.
- 2 At the > prompt, type **LD 32** and press the Enter key to access the program.
- 3 Type **DSXP x**, where **x** is the Peripheral Controller card, and press the Enter key to disable the card. The Peripheral Controller card is now disabled and you can remove it.
- 4 Unlatch the card’s locking devices by squeezing the tabs and pulling the upper and lower locking devices away from the card.
- 5 Pull the card out of the Remote IPE module and place it in an antistatic bag away from the work area.
- 6 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 7 Pull the upper and lower locking devices away from the faceplate on the card and insert the card firmly into the backplane connector. Press the locking devices firmly against the faceplate to latch the card inside the module. The Peripheral Controller card automatically starts the self-test.
- 8 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Peripheral Controller card.

- 9 At the prompt in the LD 32 program, type **ENXP x**, where **x** is the Peripheral Controller card, and press the Enter key to enable the card. If the red LED on the Peripheral Controller card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated by LD 32 on the MMI terminal connected to the Peripheral Controller card. If the LED stays on, replace the card.
- 10 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier's repair depot.

Removing and replacing a complete Fiber Remote Multi-IPE Interface unit

Note: Replace only the card, unless the Fiber Remote Multi-IPE Interface unit enclosure is also faulty, then you should replace the entire unit.

When replacing the Fiber Remote Multi-IPE Interface, you can replace the entire unit or just the card (motherboard with faceplate combination). The following procedure replaces the entire unit:

- 1 Log in on the TTY or the MMI maintenance terminal.
- 2 Disable the Superloop Network card by loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DIS sl**, where **sl** is the actual superloop number of the Superloop Network card.
- 3 Disconnect the AC/DC converter AC power cord from the wall outlet.
- 4 Disconnect the power cable from the Fiber Remote Multi-IPE Interface unit -48 V POWER connector.
- 5 Disconnect the superloop cables from SUPERLOOP connectors on the Fiber Remote Multi-IPE Interface unit.
- 6 Disconnect the fiber-optic ST connectors from the Fiber Remote Multi-IPE Interface unit faceplate XMIT A and RCV A optical connectors. If the link is redundant, also disconnect the link from the faceplate connectors XMIT B and RCV B.
- 7 Remove the unit from the wall or the rack-mounted shelf, as applicable.

- 8 Reinstall a replacement Fiber Remote Multi-IPE Interface unit in reverse order by setting the S1 and S2 dip-switches, installing the unit onto the wall or into the shelf, connecting the link, connecting the superloop cables, and installing the power cable from the AC/DC converter.
- 9 Plug the AC/DC converter AC power cord into the wall outlet.
- 10 Check the power LED on the Fiber Remote Multi-IPE Interface unit. It should be lit permanently if the unit passed self-test upon power up.
- 11 Enable all superloops by executing the **ENLL sl** command.
- 12 Press the Reset button to turn off the alarm LEDs.
- 13 Tag the defective Fiber Remote Multi-IPE Interface unit(s) with a description of the problem and prepare them for shipment to your equipment supplier's repair depot.

Removing and replacing the card in the Fiber Remote Multi-IPE Interface unit

This procedure replaces just the motherboard and faceplate combination and the enclosure remains installed and connected:

- 1 Log in on the TTY or the MMI maintenance terminal.
- 2 Disable the Superloop Network card by loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DIS sl**, where **sl** is the actual superloop number of the Superloop Network card.
- 3 Disconnect the fiber-optic ST connectors from the Fiber Remote Multi-IPE Interface unit faceplate XMIT A and RCV A optical connectors. If the link is redundant, also disconnect the link from the faceplate connectors XMIT B and RCV B.
- 4 Remove the card from the Fiber Remote Multi-IPE Interface unit by pulling the extractors away from the enclosure.
- 5 Reinstall a replacement Fiber Remote Multi-IPE Interface card into the enclosure in reverse order by setting the S1 and S2 dip-switches, installing the card into the enclosure, and connecting the fiber-optic link to the faceplate optical connectors.
- 6 Check the power LED on the Fiber Remote Multi-IPE Interface unit. It should be lit permanently if the unit passed self-test upon power up.

- 7 Enable all superloops by executing the **ENLL sl** command.
- 8 Press the Reset button to turn off the alarm LEDs.
- 9 Tag the defective Fiber Remote Multi-IPE Interface card(s) with a description of the problem and prepare them for shipment to your equipment supplier's repair depot.

Reinstalling covers

When you determine that the Remote IPE is operating correctly, do the following:

- 1 Reinstall the covers on Meridian 1 module.
- 2 Reinstall the cover on the Remote IPE module.
- 3 Terminate you session with Meridian 1 by logging out on your maintenance terminal: type Q at the: prompt and press the Enter key. If using the MMI terminal, log out to complete the test and troubleshooting session.

Packing and shipping defective cards

To ship a defective card to a Northern Telecom repair center, you should:

- 1 Tag the defective equipment with the description of the problem.
- 2 Package the defective equipment for shipment using the packing material from the replacement equipment. Place cards in an antistatic bag, put in the box, and securely close the box with tape.
- 3 Obtain shipping and cost information from Northern Telecom and mail the package to an authorized repair center.